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Purpose of Accreditation document

Futures of Engineering Accreditation

March 2024

Prepared for: Engineers Canada
Prepared by: FEA Purpose of Accreditation Task Force

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Contents

About this document

The project team is pleased to share this document outlining the Futures of Engineering Accreditation (FEA) project's draft concept for a revised purpose of accreditation. This document was written by FEA's Purpose of Accreditation Task Force and represents ideas and feedback the project has collected from its research and engagement with interest holders over the past two years.

The project team is grateful for the enthusiasm shown by interest holders across the engineering ecosystem and for their invaluable contributions.

This document, together with its counterpart: the Academic Requirement for Licensure document, outlines the draft FEA concepts at their current stage of development. This document and its contents represent work in progress.

In April 2024, a collaborative design session was held with members of the CEAB Executive Committee, CEQB Executive Committee, the FEA project Steering Committee and Regulator Advisory Group (RAG), Engineering Deans Canada (EDC), and other colleagues to review the draft concepts presented in this document and the Academic Requirement for Licensure document and discuss how their implementation would impact the engineering ecosystem.

The concepts will see future iterations based on continued engagement with interest holders. This work will be reflected in the final Path Forward Report, which will present the concepts in more detail and recommend approaches for their implementation.

As always, if you would like to get in touch with the FEA project team, please email fea@engineerscanada.ca. For comments or ideas about the project, please use this submission form, available for the project's duration. Submissions are reviewed by the project team and collected as valuable feedback.

Sincerely,
The FEA Project Team

Executive summary

The Futures of Engineering Accreditation (FEA) is an initiative by Engineers Canada, and part of its 2022-2024 Strategic Plan. The objective of the FEA is to leverage the insights, perspectives, and expertise of members of the Canadian engineering ecosystem to examine the current accreditation system, understand how it is serving contemporary needs, and consider how it can chart a new path for the future of the engineering profession.

Since its creation in 1965, the Canadian engineering education accreditation system has supported Canadian engineering regulators, been recognized as substantially equivalent under international mutual recognition agreements, and has mentored accreditation bodies across the globe. Significant changes in engineering practice and engineering education have occurred over this same period, prompting a timely reassessment of whether the purpose of accreditation adequately addresses current situational demands.

Part 1 of this document introduces the Mandate of the FEA's Purpose Task Force to either validate the current purpose of accreditation or establish a revised purpose.

Part 2 explains the Need for Change in the Accreditation System due to pressing challenges. These include the rapidly changing landscape of education and engineering practice, trends in engineering licensure, perceived rigidity within the current accreditation system, and increasing workloads for the Canadian Engineering Accreditation Board (CEAB) and the programs seeking accreditation.

Part 3 delves into the Statement on the Purpose of Accreditation, detailing the Purpose Task Force's initial efforts to validate the current statement, followed by their subsequent proposal and elaboration of this revised purpose statement:

The purpose of accreditation

> ***Accreditation provides assurance that an engineering program is designed and delivered such that its graduates meet the [academic requirement] to be licensed as professional engineers in Canada.***

Part 4 lists Design Parameters for the future accreditation system to operate effectively.

Part 5 covers the Key Success Factors for the system to achieve its intended outcomes. This includes defining the dual objectives of the revised purpose statement, describing optimal operational conditions of the future accreditation system, and integrating research and engagement findings gathered during the project.

Part 6 encompasses the Insights from Project Engagement and Research to provide the necessary support for the revised purpose statement.

Part 7 identifies the Gaps that could impact the effectiveness of the revised purpose statement and the future direction of accreditation, providing Recommendations for resolving them.

Part 8 summarizes the Next Steps of the project and explains how the information presented in this document will guide the next phase of work, including the development of the Path Forward Report.

1. Mandate of the Purpose Task Force

The Futures of Engineering Accreditation (FEA) initiative is a multi-year strategic priority in Engineers Canada's 2022-2024 Strategic Plan, encompassing several distinct phases of activity. Refer to Appendix A for a comprehensive overview of the project.

In the current phase of the project, two separate task forces are working concurrently. The Academic Requirement Task Force is focused on investigating the establishment of an academic requirement for licensure that applies to all applicants.

Meanwhile, the Purpose Task Force has been mandated to either validate the current purpose of accreditation or establish a revised purpose. The purpose is intended to be a foundational statement about why accreditation exists, what it must achieve, and for whom.

The efforts of both task forces are complementary and will contribute to determining the path forward for the entire system.

Members of the Purpose of Accreditation Task Force as of March 2024:

Luigi Benedicenti, FEC, P.Eng. Ph.D.
Kevin Deluzio, PhD, P.Eng., FCAE, FEIC
Darryl Ford, P.Eng., FEC (co-Chair)
Gillian Pichler, P.Eng. (Retired), ing., FEC (co-Chair)
Jim Nicell, PhD, P.Eng.

2. The need for change in accreditation

Engineering education has changed significantly since accreditation was introduced in 1965. While there have been updates and adaptations since then, most notably with the introduction of Graduate Attributes in 2008, the accreditation system has not kept pace with the rapid changes in Higher Education Institutions (HEI). This includes advancements in pedagogical practices, available technologies for instruction (such as the internet), experiential learning opportunities, and the emergence of new engineering disciplines, especially in niche areas.

a. Rates of engineering licensure

The patterns of engineering licensure are changing. There is a declining number of graduates from Canadian Engineering Accreditation Board (CEAB) accredited programs who are applying for licensure. The most recently published Membership Report from Engineers Canada estimates that only 44.3 per cent of recent graduates proceeded along the path to licensure.[1] Since less than half of CEAB graduates seek licensure, some HEIs question why such a resource-intensive accreditation process is still required and whether they should continue to seek accreditation.

While the number of applicants who graduated from CEAB-accredited programs declines, there is an increasing number of applications for licensure from candidates who do not hold a CEAB-accredited degree (non-CEAB applicants). In some Canadian jurisdictions, the number of non-CEAB applicants makes up more than 50 per cent of the applications received.

Regulators are obligated to ensure all license holders meet the same academic requirement for licensure, and it can be challenging to establish an evaluation methodology that is equivalent to the Canadian accreditation system. Recent pressures from government-appointed Fairness Commissioners and Ombudspersons have drawn increased attention to the importance of equitable access to the profession, thereby heightening regulators' need for consistent, impartial, and transparent pathways to licensure for all.

b. Perceived rigidity in accreditation criteria

There is a perception that the accreditation criteria impose a rigid framework which restricts program delivery, overly values outdated forms of teaching (e.g., lectures versus tutorials or laboratories over project-based learning or independent learning), limits instructors' pedagogical choices, and constrains students' ability to select courses of personal interest. This structured approach prioritizes the impartation of technical skills over the cultivation of lifelong skills such as teamwork and collaboration. Consequently, the emphasis on meeting accreditation criteria often results in a narrow focus on technical proficiency, neglecting the holistic development of students as budding professionals who are charged with mastering their own learning following graduation. The rigid program structures make it more challenging to address timely societal issues such as reconciliation, equity, diversity, and inclusion.

[1] Engineers Canada. 2023 National Membership Information, page 7.

Compared to similar accreditation systems both within and outside of Canada, the engineering industry has less involvement in the Canadian engineering accreditation system. Yet, there is push from industry leaders and the broader engineering community to equip engineering graduates with interdisciplinary skills and a strong sense of public duty to keep up with changing engineering practices. These preparations are seen as essential for tackling more complex challenges of the future.

To address the evolving environments, industry demands, and societal impacts, engineering programs are striving to incorporate competencies, non-technical skills, and personalized program delivery paths. However, the current accreditation system was not originally designed to accommodate these changes and has not kept pace with these needs, making it more challenging for HEIs to adjust effectively.

c. Accreditation workload

The Canadian engineering accreditation system is rigorous, and its specific requirements can lead to a demanding workload. The introduction of the Graduate Attributes and Continual Improvement (GA/CI) criteria, which are mandatory requirements for Engineers Canada to remain part of the International Engineering Alliance's (IEA) Washington Accord, have increased the workload for the HEIs to prepare for and maintain accreditation, and for the volunteer visiting team members. Some HEIs assumed the introduction of the GA/CI criteria would eliminate the need for input measures – currently measured in Accreditation Units (AUs) – and they continue to suggest that the input measures (AUs) should be de-emphasized or removed altogether.

3. Statement on the Purpose of Accreditation

The Terms of Reference for the Purpose Task Force were to either "validate the current purpose of accreditation or establish a revised purpose".[2]

a. Validating the current purpose of accreditation

The current purpose of accreditation is to "identify to the member engineering regulators of Engineers Canada those engineering programs whose graduates are academically qualified to begin the process to be licensed as professional engineers in Canada".[3] The

[2] FEA Purpose Task Force Terms of Reference.

[3] Engineers Canada. CEAB 2023 Accreditation Criteria and Procedures, page 6.

accreditation criteria examine the engineering curriculum (and the continual improvement thereof) as well as processes related to the admission, promotion and graduation, academic advising of students, as well as the overall environment in which the program is delivered.

For engineering regulators this means that graduates of accredited programs are not required to write confirmatory technical examinations; it is accepted that graduates of accredited programs meet the academic qualifications for licensure. This benefits graduates, reducing the time and financial impact of seeking licensure and benefits regulators by streamlining their licensure processes. Applicants seeking licensure without a degree from an accredited program may undergo confirmatory technical examinations.

The declining number of graduates from accredited programs seeking engineering licensure paired with the rise in non-CEAB graduates seeking licensure means that accreditation is streamlining the licensure process for a declining number of applicants. While regulators have traditionally been seen as the primary beneficiaries of the accreditation system, they now face an increasingly complex operation maintaining objective, transparent, equitable, and fair assessment procedures.

Those responsible for delivering engineering programs and their students are also impacted by the accreditation system, yet they often perceive the system as prioritizing the interests of regulators above all others. From an HEI perspective, continuously investing time, energy, and resources into accreditation that ultimately serves fewer and fewer graduates is becoming an increasingly questionable “investment”. Educators invest significant time, personnel, and dollars into accreditation, and they are wondering if the benefit is worth the cost.

The changing educational context in which accreditation operates, paired with the current narrow purpose statement and seemingly broad accreditation criteria, presents other challenges for HEIs. These challenges include but are not limited to, minimal opportunities to recognize alternative forms of teaching and learning and constraints imposed by the accreditation criteria on the qualifications of educators.

Many engineering students opt not to pursue licensure upon graduation. For these individuals, there may be minimal direct benefit from an accreditation system that predominantly emphasizes academic qualifications for a process they do not intend to complete.

The current purpose of accreditation may no longer be fulfilling its intended objectives while disregarding the needs of the groups it affects. While accreditation has traditionally been perceived as a tool to support regulators, there is a growing need for these perceptions to evolve into a broader and more comprehensive framework that fosters co-

design, collaboration, and open communication among the various groups within the engineering ecosystem. These genuine partnerships will be fundamental for adapting to the evolving landscape of accreditation and the future of the profession.

The current purpose of accreditation focuses on the regulator as the single beneficiary of accreditation. Accreditation touches many parties, and their needs and constraints must be considered. In their report, the FEA Benchmarking Task Force identified that the purpose of accreditation statements of comparators included more interest holders and multiple objectives. That Task Force recommended reviewing and considering the breadth of Engineers Canada's current purpose of accreditation. In the Fall 2023 consultations on the potential focus of the purpose of accreditation, interest holders were clear that focusing on one interest holder (regulators or programs or students) is a non-viable option.

Based on findings from the foundational research conducted by the FEA Benchmarking and Engineering Education Task Forces and from consultations with interest holders about what they need and want from accreditation in the future, the Purpose Task Force was not able to validate the current purpose of accreditation.

b. Establishing a revised purpose of accreditation

To address the identified challenges and establish a solid foundation for the future accreditation system, the Purpose Task Force transitioned from validating the current purpose statement to establishing a revised one. As a result, the revised purpose of accreditation is proposed as follows:

The purpose of accreditation

> ***Accreditation provides assurance that an engineering program is designed and delivered such that its graduates meet the [academic requirement] to be licensed as professional engineers in Canada.***

It is important to understand two key points about the terminology in this statement:

1. Firstly, "engineering program" should be interpreted broadly to extend beyond the offerings of traditional undergraduate curricula at an HEI. The term denotes a framework that may include a diverse range of courses, activities, or experiences, strategically designed to achieve specific learning outcomes or objectives.

2. Secondly, the term "[academic requirement]" functions as a placeholder for the name of the specific academic conditions determined by FEA's Academic Requirement Task Force. Once it is clearly defined, the academic requirement for

licensure is expected to directly align with and be consistent with the preparation of non-CEAB applicants for licensure.

The revised purpose statement embraces a new approach that recognizes the different needs of engineering programs, the students, and the regulators within the accreditation system and strives to balance their interests without prioritizing one group over another.

While there were some questions regarding whether accreditation should remain linked to licensure, interest groups engaged in the project to-date have expressed robust support for maintaining this linkage.

c. Three focuses of the revised purpose of accreditation

There are three distinct interest groups whose needs can be addressed with greater equality under the revised purpose of accreditation.

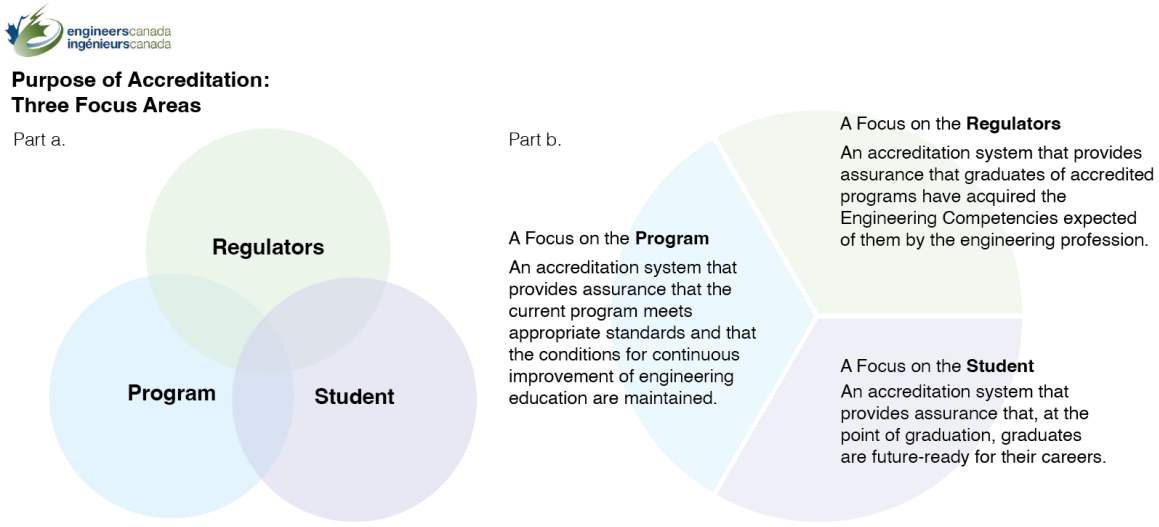

Figure 1: The three focuses of the revised purpose of accreditation.
Part a: Illustrative of the intersecting needs of the three distinct interest holders.
Part b: Illustrative of the equitable needs of the three distinct interest holders, originated from the 2022 Foresight Session and garnered support from regulators during the Fall 2023 consultations.

Engineering programs

Engineering programs seek accreditation based on the curriculum content they offer. The key verbs of “design” and “deliver” in the revised purpose statement infer greater support for flexibility and innovation. The program design ensures long-term efficacy, while program delivery focuses on the present, ensuring compliance with standards and preparing and evaluating current students.

The statement deliberately omits specifying that accreditation is solely for engineering programs at the undergraduate level. This flexibility allows for the definition to encompass existing accredited engineering programs while leaving space for potential future programs beyond the traditional undergraduate degree.

Students

While not every student will seek licensure after graduation, accreditation of engineering programs helps ensure graduates are (1) equipped with the necessary skills and knowledge to thrive in their future careers; and (2) have a clear path toward licensure, should they choose to pursue it. Accreditation is an acknowledgement that they have satisfactorily completed a program that has academically prepared them for the profession. For those who choose to pursue licensure, accreditation helps expedite the process.

Regulators

Regulators maintain confidence that graduates from CEAB-accredited programs have acquired the foundational knowledge and skills expected of them for entry into the profession. Accredited programs facilitate regulators’ assessment of applicants’ academic qualifications, which constitute just one of the five criteria typically examined by regulators for licensure.

4. Design parameters for the future accreditation system

As the Purpose Task Force discussed potential purposes of accreditation, they considered the extent of the future system’s scope and the conditions necessary to ensure it operates at an acceptable level.

i. The future accreditation system must be simple, flexible, and adaptable over time.

The rapid pace of change in engineering education (including knowledge and pedagogical practice), engineering practice, and societal trends underscores the importance of maintaining an agile and responsive accreditation system. The system must not only prepare today's engineering graduates but also stay abreast of dynamic shifts to effectively prepare tomorrow's graduates.

Simplicity, flexibility, and adaptability are essential to ensure the continued relevance of accreditation and to make space for innovation in education, with the goal of streamlining and enhancing the educational experience of students. Programs must remain adaptable – both in program content and mode of delivery – to equip graduates with the knowledge and skills required to address increasingly complex challenges. The accreditation system must also remain versatile enough to accommodate diverse and non-traditional pathways to knowledge acquisition.

ii. The future accreditation system must be outcomes-focused.

The 2022 reports *Benchmarking the Canadian Engineering Accreditation System* and *Current and Emerging Practices in Engineering Education* collected information about the practices and trends of accreditation and education for various professions and jurisdictions. The reports revealed that Canadian engineering education accreditation relies heavily on inputs, including a 'minimum path' requirement and a time-length input requirement for degree duration. The findings suggest that the current Canadian engineering accreditation system does not align with global practices, which place stronger emphasis on outcomes.

The current combination of input (i.e. Accreditation Units) and outcome measures (i.e. Graduate Attributes) complicates assessments and contributes to perceptions that accreditation is burdensome for HEIs. Transitioning to a more outcomes-focused model would align Canadian accreditation practices more closely with the trends observed in other professions and jurisdictions, while also complementing the growing regulatory shift towards Competency Based Assessment (CBA) licensure processes.

iii. The future accreditation system must achieve alignment between the educational approach and the accreditation criteria.

As education content and pedagogy evolve, accreditation must evolve as well. Accreditation criteria must be updated to align with the current trends in educational design and delivery. The accreditation system should not impede innovation in education

but rather align with the principles of programmatic design and delivery outlined in the revised purpose statement.

iv. The future accreditation system must consider the equity of application across all institutions, taking into consideration local context and different levels of access to resources.

The accreditation criteria must be focused on assessing the core requirements of engineering programs and not serve as a comparative assessment of the HEI's services, which will inevitably vary from institution to institution based on geographic, demographic, or resource constraints.

v. The future accreditation system must value experiential learning.

Experiential learning should be recognized as a valuable component of the educational preparation of students. This could be bolstered by a definitive statement emphasizing its value and allowing for the exploration and implementation of alternative forms of program delivery. Experiential learning includes but is not limited to project-based learning, interaction with practicing professionals, domestic and international student exchanges, and cooperative or internship experiences.

vi. The future accreditation system must be based on defensible evaluation processes.

Defensibility means that the accreditation criteria, methods, and resulting decisions are supported by evidence – whether it be quantitative or qualitative – and can be clearly justified, contributing to transparency and legitimacy within the process. These attributes promote trust in the accreditation process and its outcomes.

vii. The future accreditation system must balance evolving criteria.

As the accreditation system evolves to remain current, new criteria will inevitably be introduced. However, to maintain the focus and alignment of accreditation's scope with its intended purposes, it is essential to remove outdated criteria. This proactive measure prevents the scope from expanding uncontrollably. Managing the criteria judiciously is key to maintaining feasibility, ensuring a favourable return on investment in terms of resources and costs incurred, and preventing programs from growing unnecessarily. A process that systematically and predictably reviews, revises, and deploys criteria must be developed to ensure stability and sustainability for all interest holders. Ad-hoc and piecemeal criteria revision must be avoided.

viii. **The future accreditation system must optimize the use of peers to conduct evaluations.**

Accreditation evaluations depend on peer-review processes, which involve experts from various fields, both academic and non-academic, to ensure a thorough assessment of programs' adherence to established standards. Engaging peers with varied backgrounds and expertise cultivates a diverse and inclusive perspective during evaluations. The accreditation criteria must be written such that programs can demonstrate compliance to a peer and a peer can evaluate compliance without requiring specific deep knowledge that is not broadly held by peer volunteers. These peers should undergo comprehensive orientation and instruction to ensure that evaluations are conducted fairly and effectively, within the scope of accreditation, and meet the desired objectives.

ix. **The future accreditation system must incorporate and recognize content of 'feeder' programs.**

The statement on the purpose of accreditation emphasizes that engineering programs are "designed and delivered *such that its graduates* [emphasis added] meet the [academic requirement] to be licensed as professional engineers in Canada." This implies that HEIs can demonstrate through the accreditation process that all graduates of their programs, regardless of their starting point, have either met or exceeded the established academic requirements for licensure.

x. **The future accreditation system must provide value to regulators and expedite the licensure process for graduates.**

Engineering regulators have confidence that graduates of accredited programs are academically prepared for licensure, allowing them to streamline their academic review procedures accordingly.

Graduates have confidence in the quality of their program, knowing it has met rigorous standards that are nationally recognized. They benefit from expedited acceptance of their academic qualifications without the need for further confirmatory processes. The continued development of the Full Spectrum Competency Profile, which defines all the competencies required of an engineer at the various points in their career development – from learner to graduate to licence holder – that is aligned with Graduate Attributes introduces students to pan-Canadian Work Experience Competencies at an early stage. This early exposure offers a distinct advantage to graduates pursuing licensure.

xi. **The future accreditation system must ensure that all applicants for engineering licensure are evaluated against equitable and equivalent standards.**

A key goal of the accreditation system is to strive for consistency in learning expectations and standards to ensure equitable access to the profession. This means that all applicants, whether they are graduates of CEAB-accredited programs or not, are held to the same educational standards.

The revised purpose statement explicitly mentions that graduates must meet the [academic qualification] required for licensure. This qualification, currently known as the National Academic Requirement of Licensure being proposed by the Academic Requirement Task Force, is highlighted in the revised purpose statement because it must be integrated into the accreditation system and apply universally, regardless of graduates' academic backgrounds.

xii. **The future accreditation system must avoid the duplication of other processes of evaluation of programs.**

The accreditation system must prioritize the distinctive aspects of engineering education and adhere to the standards outlined in the evaluation criteria, while avoiding redundancy with other program evaluation processes and quality standards assessments legislated and overseen by provincial governments and agencies. This will prevent unnecessary burdens and redundancies on HEIs.

Where possible, trusted third party reviews/approvals should be assessed with respect to their fulfilling accreditation requirements for program environment, leadership, human resource and financial, progression and other such criteria that do not require the specialized engineering education knowledge of peer reviewers.

xiii. **The future accreditation system must prepare graduates to demonstrate their competencies and skills to employers.**

Accreditation ensures that prospective employers can have confidence in graduates from accredited programs, knowing they possess the knowledge and skills expected of new entrants to the engineering profession.

xiv. **The future accreditation system must enable national and global mobility of students and graduates.**

Accreditation significantly enhances the mobility and portability of learning opportunities and the recognition of qualifications. By attesting to the reputational quality of a program,

accreditation facilitates access to educational opportunities not available at students' home institution, such as co-ops or exchanges. Mutual recognition agreements, like the Washington Accord, enhance international credential recognition and promote the mobility of engineering professionals across borders.

xv. The future accreditation system must communicate its value and enhance public perception of accreditation as whole.

The public must have confidence that graduates from accredited programs have received a high-quality education that prepares them to contribute effectively to society through their chosen profession.

5. Conditions for the success of the future accreditation system

By embracing the revised purpose statement and operating in accordance with the system's design parameters, the future of accreditation will be poised to address some of the current challenges and function more optimally moving forward. Conditions for the success of the future accreditation system include:

i. Embracing dual objectives

The proposed purpose of accreditation and design parameters aim to establish dual objectives for accreditation, forging a system that not only evaluates adherence to current standards but also empowers HEIs to remain current and adept at planning for and responding to the evolving educational needs of the engineering profession.

Accredited programs are pivotal in equipping graduates with the essential knowledge and skills required to navigate the complexities of the engineering field, preparing them for licensure and success in their careers. In parallel, the accreditation system must transcend mere compliance with existing standards; it must implement processes that safeguard HEIs from falling behind amid industry transformations, technological advancements, and evolving societal demands.

By implementing strategies that promote and embrace simplicity, flexibility, and adaptability, accredited programs seamlessly integrate emerging disciplines and methodologies into their curricula, thereby ensuring graduates are thoroughly prepared to address the challenges of tomorrow. This forward-thinking approach not only sustains the relevance and efficacy of accredited programs in the present but also positions them at the

forefront of engineering education, poised to meet the evolving needs of the profession effectively.

ii. Fostering equitable and aligned interests

Instead of prioritizing the needs of regulators over others, the revised purpose statement strives to balance the interests of regulators, HEIs, and students. Accreditation touches many parties, and their needs and constraints must be considered. By ensuring equitable consideration for all these interest holders, the future accreditation system will be more inclusive and impactful.

To cultivate this balanced approach, perceptions of inequality among interest groups, black boxes, and silos must be overcome through co-design, collaboration, and open communication. The future accreditation system relies on interest holders being willing to engage in authentic partnerships and embrace a vision that promotes shared goals and national alignment.

iii. Linking to the Academic Requirement for Licensure

The FEA project probed the correlation between the accreditation system and the need for a national academic requirement for licensure. Feedback from the Foresight Session and Simulation Exercises showed widespread agreement for affirming this link.

The revised purpose statement underscores the objective of accredited programs to ensure that graduates meet the “academic requirement” to be licensed as professional engineers in Canada. What comprises the academic requirement is under development by FEA’s Academic Requirement Task Force and will be proposed in a complementary document.

Together, the revised purpose of accreditation statement and the national academic requirement for licensure will benefit the three focuses by:

- Providing HEIs with a clearer understanding of the curriculum needed to adequately prepare students for success in their careers.
- Providing students with confidence in the quality of their program and a clear understanding of how their education prepares them for licensure, while also enabling expedited licensing for graduates who choose to pursue it.
- Establishing a standardized benchmark for regulators to evaluate the academic preparedness of engineering graduates, irrespective of their educational backgrounds. This alignment facilitates assessment processes by streamlining procedures, minimizing variability, and reducing ambiguity for regulators.

iv. Shifting Focus from Public Safety

Throughout the project, interest holders extensively discussed the relationship between accreditation and public safety. They concluded that while engineering programs play a role in educating students about ethical considerations, instilling a duty to safeguard and maintain the best interests of the public and providing them with the necessary tools to navigate complex situations, the ultimate responsibility for maintaining public safety rests with engineering regulators. These regulators are tasked with safeguarding the public by licensing only competent engineers who understand and adhere to their professional and ethical obligations. Therefore, while accreditation contributes to the broader goal of producing competent engineers and instilling a strong sense of duty to the public, its primary focus is on assessing the academic quality of engineering programs rather than directly addressing public safety concerns.

As a result, the revised purpose statement does not explicitly emphasize public safety, nor do the design parameters. This updated model helps reinforce the distinction between accreditation and public safety concerns.

v. Balancing education quality and job readiness requirements

While past approaches to accreditation often juxtaposed education quality against ensuring graduates' job readiness, the revised purpose statement and design parameters recognize that these objectives can complement each other rather than being at odds. Implementing the future accreditation system requires appropriate governance structures that fulfill this vision without becoming entangled in bureaucratic complexities.

6. Insights from project engagement and research supporting the revised purpose statement

i. Value of accreditation

A fundamental question for this project was whether accreditation retains its value for interest holders. Throughout the project, regulators, students, and engineering programs have affirmed that they derive substantial benefits from accreditation and recognize its enduring value. Regulators have confidence that the accreditation system ensures that graduates from CEAB-accredited programs possess the academic qualifications needed to initiate the licensing process. HEIs uphold their reputation through the recognition and quality of their engineering programs. Students receive support in attaining their educational and career aspirations, along with streamlined licensing processes.

ii. Modernization

After confirming the value of the accreditation system, interest holders agree on the need for modernization to remain pertinent amid the rapidly changing, complex world. This process starts by emphasizing equity among accreditation's interest holders and building stronger relationships to tackle the changes effectively.

When FEA interest holders adopted a longer-term perspective, there was significant consensus on the future direction of the engineering profession. It was clear that the engineers of the future need to be environmentally and socially aware, and interdisciplinary problem solvers with a strong sense of duty to the public. Modernizing the system would preserve the existing benefits for each interest group while also enhancing its overall effectiveness.

iii. Skills and competencies of the engineering profession

The revised purpose statement underscores the assurance that engineering programs are designed and delivered to provide graduates with the academic qualifications necessary for licensure. This means accreditation remains pivotal in preparing future engineers to navigate the complexities of a rapidly changing world.

Beyond technical proficiency, engineers must embody a diverse range of competencies to tackle modern challenges. This includes environmental and social awareness, interdisciplinary problem-solving skills, a strong sense of public duty, and a commitment to lifelong learning. By instilling these qualities, accreditation ensures that graduates are not only technically adept but also equipped to handle ethical dilemmas, collaborate across disciplines, and contribute meaningfully to society's well-being.

iv. Program flexibility and adaptation

Currently, accreditation upholds the quality of engineering programs, but its structure often struggles to keep pace with evolving pedagogical and student needs. Introducing greater flexibility and adaptability into the accreditation process would enrich the overall educational experience for students. A more dynamic system would support innovations and provide students with a broader range of learning opportunities. Administratively, enhanced flexibility and adaptability would reduce bureaucracy and barriers, leading to improved governance and a more streamlined and effective accreditation process.

v. Linkage to academic requirements and pathways to licensure

The future system must maintain the linkage between accreditation and an academic requirement for licensure. This entails developing an academic requirement that promotes more equitable access to the profession by ensuring fairness for all applicants and applying standards consistently, irrespective of their academic background or chosen pathway to licensure.

7. Known gaps and actionable recommendations for the path forward

Many aspects of the revised purpose statement will necessitate further exploration and collaboration in the next phase of the FEA initiative.

i. Terminology

Known gap: This document has aimed to articulate the purpose of accreditation in plain language, yet there are many terms that may not be as straightforward as they initially seem (i.e. “program”). This presents a significant risk of varied interpretations, potentially leading to confusion, increased complexity, lack of consensus, and a decline in support for the proposed ideas.

Recommendation: Clarify essential terminology and crucial concepts.

Key terminology and concepts that underpin the strength of the purpose of accreditation need to be thoroughly explained in the Path Forward Report and throughout the implementation of the accreditation system. A shared understanding of these elements is foundational to its future success.

ii. “Academic requirement”

Known gap: The revised purpose statement helps regulators identify those programs whose graduates have met the academic requirement for licensure. However, without a clear and concise definition of what comprises the academic requirement, it can be challenging to ascertain if graduates have fulfilled it.

Recommendation: Provide a definition of the academic requirement.

Using the Academic Requirement Task Force report as a foundation, the Path Forward Report must provide a precise and explicit definition of the academic requirement to

ensure clarity and consistency in its application. Additionally, it is imperative to ensure that the definition of the academic requirement remains equitable and consistent for graduates of both CEAB and non-CEAB institutions.

iii. Return on investment

Known gap: Throughout the project, interest holders strongly affirmed their support for the value of accreditation; however, their continued support hinges on perceiving a commensurate return on investment.

- HEIs are always mindful that the considerable resources allocated to accreditation are diverted from other initiatives or priorities, which is especially problematic in their resource-constrained environments.
- Students desire a program that adequately prepares them for their future careers.
- Regulators' academic qualification processes may not be adequately equipped to handle the increasing demand from graduates of non-CEAB institutions, leading to potential inefficiencies and resource strain.

Recommendation: Modernize the accreditation process to strike a balance between rigorous standards and practical efficiency.

To uphold its significance, it will be imperative that the system retains tangible benefits for all interest holders while avoiding excessive burdens. The Path Forward Report should focus on the importance of aligning and equalizing the interests of all interest holders, emphasizing how the future accreditation system will position them to achieve a better return on their investment.

iv. Collective stewardship

Known gap: The current accreditation system is narrowly focused on meeting the needs of regulators. However, as the revised purpose statement aims to balance the needs of regulators with HEIs and students, it is imperative that the criteria reflect and respond to the needs of all interest holders.

Recommendation: Empower all interest holders to actively participate in shaping the future accreditation system.

To ensure that the future accreditation system truly represents those it serves, it is imperative that all interest holders feel empowered to actively participate in shaping its development and management. This involves acknowledging their input and establishing a formal method for their contributions across various aspects of the system, including

shaping criteria, policies, and procedures. The contribution mechanism should embody the principles of co-design, collaboration, and open communication to foster a sense of stewardship and inclusivity among the involved parties.

v. Outcomes

Known gap: The current accreditation system emphasizes both program inputs and program outcomes.

Recommendation: Emphasize an outcomes-focused approach.

In the future accreditation system, transitioning to a more outcomes-focused approach is one of the key design parameters to aim for. The Path Forward Report should prioritize this, emphasizing the development of graduates' competencies and their well-rounded skill sets. It should also align with practices observed in other professions and with other signatories of the Washington Accord.

vi. Experiential learning

Known gap: The current accreditation system restricts the range of experiential learning opportunities available to students and undervalues the significance of such experiences.

Recommendation: Expand acceptance for various forms of experiential learning.

An outcomes-focused system enhances recognition for the educational value offered by experiential learning. This entails establishing a clear definition and guidance on how such experiences contribute to a student's educational preparation. Additionally, this recognition should not be confined solely to internships and co-ops but should encompass a broader spectrum, including fieldwork, project-based learning, unsupervised learning, and interactions with practitioners in the classroom. The Path Forward Report must endorse experiential learning rather than stifle it.

vii. Program exchanges

Known Gap: The current accreditation system restricts the range of domestic and international learning opportunities available to students and undervalues the significance of such experiences.

Recommendation: Facilitate program exchanges to enhance educational experiences and opportunities for students.

An outcomes-focused system enhances recognition for the educational value offered by program exchanges. This entails establishing a clear definition and guidance on how such exchanges contribute to a student's educational preparation. The Path Forward Report must endorse program exchanges rather than stifle them.

viii. Educational curriculum and learning environment

Known gap: Compared to other accreditation systems, Engineers Canada's purpose is narrower in scope. While learning environment factors are not formally included in the current purpose statement, aspects such as the quality of faculty, morale of students, and suitability of leaning facilities are evaluated. Evaluation of these aspects of the learning environment is a requirement of all signatories to the Washington Accord.

Recommendation: Deliver clear guidance for incorporating learning environment factors into accreditation decisions.

The Path Forward Report must provide clear guidance on how the future accreditation system will consider learning environment factors in its decision-making. These factors should be subject to review, but they should not unduly influence the final accreditation decision unless they directly impact program outcomes. As maintaining signatory status to the Washington Accord is a priority for Engineers Canada, criteria that align with the purpose and scope of the future system must also demonstrate substantial equivalence with Washington Accord signatories.

ix. Peer reviewers

Known gap: Accreditation's efficacy relies heavily on the active participation and qualifications of peers within the system. There is a notable risk in depending on peers who lack the necessary qualifications or have not undergone adequate training. Collectively, peer review teams may lack the diverse range of competencies needed to comprehensively assess a program against the established standards. Given that peers vary in their backgrounds and expertise, the criteria, policies, and procedures of the accreditation system itself may not be easily interpretable or applicable by others, depending on how they are developed and by whom.

Recommendation: Leverage qualified peers to enhance the accreditation system's peer review functions.

In a peer-review system, it is essential to clearly define who qualifies as a peer to ensure effective evaluation and assessment. It also requires that visiting teams be comprised of

members that collectively have the range of complementary competencies that are required to assess program's compliance with accreditation criteria.

Representation of various voices in the broader engineering community (i.e. both the academic and professional) provides a well-rounded perspective on the accreditation of engineering programs. To ensure effective and fair evaluations, the members of the visiting accreditation team must receive thorough training and orientation to adeptly assess the system's standards and apply its procedures.

Considering the dynamic nature of accreditation processes, peers also need to be mindful about formulating criteria, policies, and procedures that are easily understandable and reviewable by future peer reviewers and interest holders.

Engineers Australia has published the *Accreditation Information Guide for EA Volunteers*, offering an overview of its accreditation system and outlining expectations for its accreditation volunteers. This guide could serve as a model for Engineers Canada to recruit, train, and ensure the competency of its own accreditation volunteers.

The Path Forward Report must emphasize the roles of these key players and the importance of providing them with the necessary resources to effectively fulfill their responsibilities.

x. Faculty qualifications

Known gap: The current accreditation criteria require a portion of engineering science and/or engineering design to be delivered by faculty members holding, or progressing toward, professional engineering licensure. This restricts who can teach within these programs and limits the pool of potential educators.

In other countries, the licensure requirements for faculty in engineering education systems are less stringent. Metric 1.3.5 "Licensure requirement for faculty" in the *Benchmarking the Canadian Engineering Accreditation System* highlights this variation.[4] It indicates that Australia, France, and Poland do not mandate licensure for faculty. In Malaysia, only 30 percent of actively teaching engineering faculty need to be registered.

Recommendation: Review the necessity and reasoning for faculty licensure requirements and consider whether alternatives could achieve the same desired outcome.

[4] Benchmarking the Canadian Engineering Accreditation System, page 13.

The faculty need to be representative of the broader engineering community to bring diverse perspectives and experiences into the educational environment and enrich the learning experience for students. Furthermore, licensure expectations for faculty should not be at odds with provincial/territorial regulator definitions of whether teaching engineering is the practice of engineering.

8. Next steps

The information and recommendations in this document will serve as foundational inputs for the discussions and preparations of the Co-Design Session scheduled for April 2024. This session, with participation from key interest holders, including the project Steering Committee, the CEAB, CEQB, Engineering Deans Canada (EDC), and the Regulator Advisory Group, will concentrate on the contents of this document and the accompanying document from the Academic Requirement Task Force.

During the Co-Design Session, the participants will prioritize addressing how to tackle the identified gaps and recommendations. After the session, the conclusions drawn from these discussions will shape the contents of the Path Forward Report. This report will outline the direction of accreditation and propose implementation strategies aimed at achieving the envisioned future system.

Appendix A: Project background

a. About the Futures of Engineering Accreditation

The FEA is an initiative by Engineers Canada, and part of its 2022-2024 Strategic Plan. The objective of the FEA is to leverage the insights, perspectives, and expertise of members of the Canadian engineering ecosystem to examine the current accreditation system, understand how it is serving contemporary needs, and consider how it can chart a new path for the future of the engineering profession. The strategic priority aims to bring together the diverse perspectives of the Canadian engineering ecosystem to create an accreditation system that moves everyone forward together. Expected project outcomes include:

1. All interest holders understand the **purpose of accreditation.**
2. Regulators have an **academic requirement for licensure**, applicable to all.
3. Engineers Canada, including the CEAB and CEQB, have **direction to implement systems** aligned with the purpose and the academic requirement for licensure.

This project is done in partnership with Coeuraj, a design and facilitation consultancy. The "project team" includes Engineers Canada staff and Coeuraj personnel.

b. Adapting accreditation: The evolution and importance to Canadian engineering

Since its creation in 1965, the Canadian engineering education accreditation system has supported Canadian engineering regulators, been recognized as substantially equivalent under international mutual recognition agreements, and has mentored accreditation bodies across the globe. Significant changes in engineering practice and engineering education have occurred over this same period. From technological advancements to the emergence of new and alternative educational delivery methods, the learning context for today's engineers is far different from that of the past.

The skill set required of a modern engineer is continually shifting. Engineers Canada wants to ensure that accreditation still provides value while remaining contextually relevant by adapting to the changing educational and professional environments.

c. Project journey

This is a multi-year project with different phases. The key activities include:

- Benchmarking the Canadian accreditation system and investigating a minimum academic requirement for licensure.
- Conducting a fundamental review of the current accreditation system and re-examining its purpose in the context of the overall licensure system.
- Gathering the different perspectives of the Canadian engineering ecosystem to shape future evolutions of accreditation to best meet society's needs.
- Delivering a Path Forward Report which provides direction to Engineers Canada, including the CEAB and the Canadian Engineering Qualifications Board (CEQB), with direction to implement systems aligned with the purpose of accreditation and the academic requirement for licensure. The report will explain future direction, and present recommendations to close the gaps between the current and envisioned future state.

There are four main phases of the project which have spanned from 2021 until the present. They are as follows:

Phase 1 – Research

In May 2021, the engineering regulators approved a new strategic priority to investigate and validate the purpose and scope of accreditation. To begin this work, members of the engineering ecosystem gathered perspectives on the current context in which the accreditation system functions. The Benchmarking Accreditation Task Force was created to conduct research to compare the Canadian engineering accreditation system with national and international comparators. The Engineering Education Task Force was created to understand current and emerging trends in engineering education. In a workshop with educators and regulators, the current realities of engineering education were explored with those who experience them daily. The two task forces compiled their findings in their respective reports, *Benchmarking the Canadian Engineering Accreditation System* and *Current and Emerging Practices in Engineering Education*. The reports were published in March 2022 and subsequently discussed with regulators to set the context for all future work. This upfront work served as the foundation for the project pathway.

Phase 2 – Understanding the existing system

Members of the Canadian engineering ecosystem were engaged to share their unique perspectives, including their experiences and expertise in the overall licensure process and accreditation system.

In May 2022, the project team facilitated a collaborative session with EDC to map out responses to four key questions pertaining to the purpose and scope of accreditation. In September 2022, the project team convened separate meetings with the CEAB and CEQB and collected their perspectives on the purpose and structure of the accreditation system.

In November 2022, the project team hosted more than 70 individuals from the engineering community at a strategic foresight session to imagine "the engineer of the future" and the prerequisites for their success. One of the central messages emerging from the event, as documented in the *Foresight Session Event Journal*, is that "participants saw a need for engineers who are values-based leaders, who are technically excellent and actively collaborate across disciplines, are mindful of the future and maintain curiosity and a desire for lifelong learning."

Phase 3 – Introducing new voices

Over six weeks during Spring 2023, the project team led a series of virtual simulations, a structured form of brainstorming and exercises which invited 80 participants from the engineering community to explore the accreditation and licensure systems. The simulation experience was designed to bring together a variety of perspectives for envisioning who the engineer of the future is and what they need, and to understand how the systems might react to different purposes of accreditation and to potential national academic requirements for licensure. The virtual simulations unlocked key learnings about the collective work needed to evolve the engineering accreditation system. The data synthesized from the simulations indicated that:

- Participants are aligned that accreditation should have a role in the engineering ecosystem to ensure quality control and professional integrity, but it needs significant change to be fit for purpose.
- There is value in having clearly defined, transparent standards for engineering knowledge and competence at a national level. The data also suggest that this requirement should address a general, baseline level of technical knowledge complemented with professional competencies and an understanding of the ethical responsibilities of an engineer.
- The relationship between accreditation and the academic requirement for licensure is not yet clear and requires further work.

The Purpose Task Force and the Academic Requirement Task Force used the data from the virtual simulations to build viable options for the future. In Fall 2023, the project team conducted 13 in-person consultations with regulators, the EDC, the CEAB, and the CEQB to

discuss draft concepts for a renewed purpose of accreditation and a national academic requirement for licensure.

Also in late 2023, the project team conducted four interviews with leadership from Canadian accreditation and/or regulatory bodies for the professions of nursing, accounting, and architecture. The findings underscore the shared challenges and approaches among these professions in accrediting programs for interest holders with different needs and objectives, evaluating foreign-trained practitioners, and offering diverse pathways into the profession.

During the same timeframe, the project team launched a survey aimed at actively engaging specific interest holders, including current and former students of CEAB-accredited programs, international engineering graduates, applicants for engineering licensure, and people with or without an engineering license working in engineering. Participants were asked to share their insights and experiences related to accreditation, competencies, and the process of obtaining an engineering license in Canada. The survey responses contributed to the ongoing work and validation around development of the purpose of accreditation and a national academic requirement for licensure.

Current Phase (Phase 4) – Nurturing an emergent system

The Purpose Task Force and the Academic Requirement Task Force relied on data collected during the previous phases of the project to inform and define the future purpose and scope of accreditation and a national academic requirement for licensure. Recommendations from the task forces will become the foundation for shaping the future of the accreditation system, which will be documented in the Path Forward Report for release later in 2024.